

THE STORY OF SLEEEEEEEEEEEEEEEEEEEEP

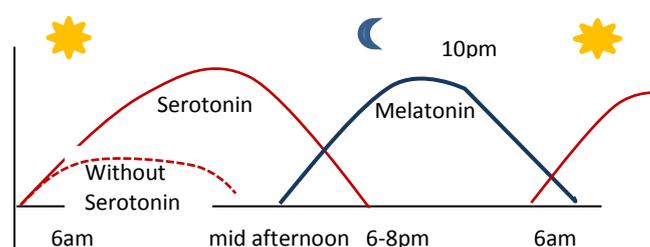
In order to have efficient and normal functioning of all systems in the body adequate and restorative sleep must be obtained. Mental and physical health is directly affected by an individual's sleep patterns with poor sleep resulting in a reduced ability to ward off and cope with sickness, a reduced capacity for cellular healing, repair and replacement. This can directly result in altered body system functions and processes that can adversely affect overall wellbeing, particularly in those with autoimmune and other inflammatory conditions. Lack of sleep can also lead to changes in; moods, anxiety, irritability, cognitive function and concentration. Loss of adequate and restorative sleep has also been associated with reduced balance and hand eye co-ordination with the potential for increased injury and decreased capacity to complete work tasks.

Sleep is considered to be a dynamic process which involves continuing brain activity which acts to produce and release hormones and proteins essential for organ system regulation as well as growth and tissue repair. The attainment of adequate sleep encourages the maintenance of emotional and social functioning while awake by giving a rest during sleep to the parts of the brain that control emotions and social interactions.



Brain chemicals and hormones such as serotonin, adrenaline, melatonin and cortisol are directly involved with many signalling pathways and organ functioning in the human body. These chemicals are involved in nerve signalling processes and play an important part in controlling the sleep and waking processes by stimulating different parts of the brain and inhibiting other parts of the brain to either promote sleep or keep a person awake. External factors of exercise, light and darkness can aid in the promotion and inhibition of hormones with synergistic effects of multiple chemicals.

For example, the production of serotonin (hormone of light) is stimulated by UV light and can be heightened in effects with morning exercise, the hormone increases throughout the day period and starts to decrease mid-afternoon to low levels at 6-8 pm. This decreasing of the serotonin level stimulates the increasing of melatonin (hormone of darkness) to an optimal level at around 10pm which promotes sleep. However, if serotonin levels are low this could result in sleepiness at an earlier point in the day and altered production of other hormones.



Sleep Science

Circadian Rhythms

These are the rhythms of your body's biological clock which influence many functions of body including body temperature and sleep-wake patterns. Circadian rhythm can be affected by external stimuli such as work and travel times, medications, eating times as well as external noises such as traffic, alarms and music. People that engage in shift work or international travel that involves crossing time zones can experience an altered rhythm causing a conflict in their body clock for a number of days until adjustment occurs. Symptoms similar to 'jet lag' can be experienced due to the bodies regulating cues for sleep (such as light and hormones) being in conflict, and subsequently, a person may find it difficult to sleep when they need to and sleepy when alertness and activity is required.

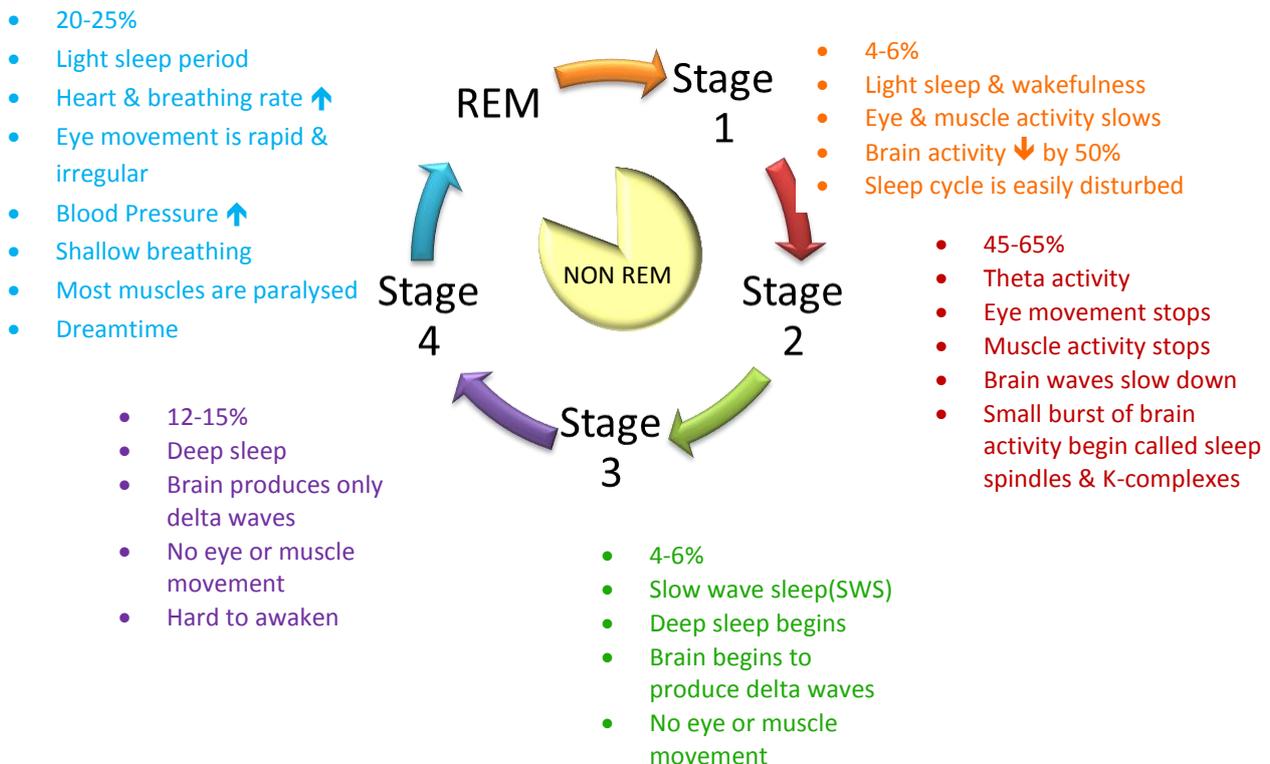
Long term disruption of a natural circadian rhythm can result in increased illness risk in many major organs including the heart, lungs, gastrointestinal tract. Emotional and mental health problems can also arise as a long term consequence of altered body clock rhythms.

Cycles of sleep

Sleep cycles last approximately 90 minutes but can in some people be as little as 70 and as much as 110 minutes in duration. The majority of people will experience 4-5 complete cycles per sleep session. The first 4 stages of sleep are known as Non Rapid Eye Movement stages and the final stage as Rapid Eye Movement (REM).

An individual's sleep cycle moves through periods of light sleep (Stage 1, Twilight Sleep) to gradually deeper sleep (Stage 2) and then deep slow wave sleep (stage 3-4). This process takes approximately 60-70 minutes. Our body then starts to come out of its deep sleep state into a lighter dreamtime sleep (Stage 5 or REM). During REM sleep stage the only voluntary muscles generally moving are the eyes which move irregularly and have a rapid movement pattern. It is in this stage that dreaming occurs. It is also the stage in which it is thought that memory is consolidated and emotional balance is restored reducing anxiety and depression. Towards the end of a sleeping session it is common to have a cycle which does not reach the deep sleep stages of 3 and 4 as the body prepares you for waking. Each stage within the sleep cycle is associated with physiological processes that can be stimulated or suppressed by a combination of biochemical body processes and external stimuli.

The following diagram outlines some general processes for each stage.



The amount of time spent within each stage of the sleep cycle will change depending on emotional stress, illness, age and other external factors such as medications, general health and lifestyle factors such as diet, exercise, alcohol and caffeine consumption. The number of sleep cycles may also alter depending on the individual, with fewer cycles within a sleep period, and reduced amount of time in deep sleep, associated with the aging process. The adoption of sleep pattern incorporating short and longer naps throughout the daytime period can also alter night time sleep cycle patterns.

Power Naps



A brief sleep period or 'power nap' can alleviate mid-afternoon sleepiness, improve alertness, increase cognition and improve mental and social ability. It is also thought to improve short-term memory and mood.

The length of a nap is an important consideration as it can both positively and negatively affect alertness and functioning ability as well as night time sleep capacity.

The groggy feeling that occurs after taking a long nap is called 'sleep inertia' and the length of time that this inertia is experienced is directly influenced by the amount of time spent within a deep sleep (slow wave sleep) within the nap. A longer time spent within the deep sleep part of the cycle will result in a long period of sleep inertia. Short naps can also be associated with sleep inertia but generally of a few minutes.

Power naps of short periods are thought to be beneficial at any time however; longer naps after mid- afternoon and of durations over 1 hour can adversely affect restorative night time sleep.

Sleep deprivation

A prolonged period without sleep can have affect many body systems and alter normal regulating functions of these body systems. Sleep deprivation can results in some or all of the following effects:



- ↓ immune system function
- ↓ healing capacity
- ↓ release of growth hormone
- ↑ depression & anxiety
- ↑ drowsiness
- ↑ headaches
- ↑ variability of heart rate
- ↑ risk of Type 2 Diabetes
- ↓ metabolic activity of brain
- ↓ coordination ability & overall balance → falls, accidents & injury
- ↓ white cell count
- ↓ body temperature
- ↑ stress levels
- ↑ moodiness & irritability
- ↓ concentration & memory
- ↑ overall body pains
- ↑ heart disease risk
- ↑ risk of obesity & weight gain
- ↑ hallucinations



Sleep Conditions



There are many different sleep conditions that can affect your ability to obtain adequate rest and in some cases may have long term health consequences due to sleep deprivation and altered oxygen flow. Sleep conditions need to be investigated by specialist units that undertake sleep study tests which take measurements of brain waves, oxygen levels and breathing patterns during sleep. This can identify problems that need to be rectified in order for the individual to have lasting health and sleep.

Snoring can affect you as the snorer as well as your partner or even a whole household. A snoring individual can wake themselves up with sound level and therefore interrupt sleep cycles leading to morning-daytime tiredness and fatigue. This disruption to sleep cycles can also occur with conditions such as sleep apnoea, of which snoring can be the first reported symptom due to the muscular collapse within airways.

Sleep Apnoea is a condition when the airway collapses during sleep and depletes oxygen levels causing the individual to wake suddenly often gasping for breath. Sleep apnoea can be caused by excessive weight, reduction in muscle tone of the soft palate, the pharynx and the uvula. The condition can also be caused by the upper airway being narrowed by enlarged tonsils, nasal polyps, deviated septum and or congenital abnormalities. This condition as well as some snoring can be reduced and solved with the use of Mandibular advancement splints and in severe cases continuous positive airways pressure (CPAP).



Narcolepsy is another sleep condition defined as an illness of excessive sleep, sleep episodes or loss of muscle control (cataplexy). Episodes of sleep can occur spontaneously and last several seconds to 30 minutes. This condition is treated with medications and in many cases it is recommended that as part of the development of a healthy sleep pattern, short daytime naps are included.

Bedtime stories – a healthy sleep pattern



The establishment of a healthy sleep pattern is a way to help obtain optimal healing and health. Adults need an average of 7-8 hours of sleep per night. Children and adolescents generally require more hours. Establishing a routine of preparing for bed, spending time in low light with little stimulation of the senses can gradually relax the body and wind down prior to actually going to bed. This activity also helps in the stimuli of hormones and other chemicals that aid in obtaining restful and restorative sleep.

Routine timing of bedtimes can, overtime, allow the body to learn healthy sleep-wake patterns. With the best quality sleep is usually achieved when going to bed prior to 11.00pm. Using aids to provide extra comfort such as masks, pillows, humidifiers, oral gels, music or meditation guides can also help to promote long lasting sleep by reducing symptoms of pain and eye- mouth dryness that can often occur with autoimmune conditions.

Following are some simple tips to aid in the development of a healthy sleep pattern:

- Try to go to bed the same time every night. Your body gets used to a schedule and will be ready for sleep.
- Reduce the light stimulation in the hours leading up to sleep. If watching television then reduce other lighting in the room so as to allow the sleep hormones to subside or promote stimulation as nature has intended.
- Make sure your bedroom is cool, dark, and quiet. If possible reduce the amount of electronic stimuli such as mobile phones, clocks within 1 metre of your bed.
- Avoid working or watching television in bed.
- Deep breathing, meditation and yoga practice will support a healthy sleep pattern and aid in relaxation, preparing you for sleep.
- Sleeping pills are a short term fix only to get you over a difficult sleep or emotional situation. They can put extra stress on the body regulating systems creating long term problems by preventing biochemical pathways related to sleep and other organ functions to be completed resulting in add on health problems. Consider using other products and practices such as camomile, passionflower



and other herbal teas and therapies. The development of a healthy sleep pattern has more long term benefits for health.

- Reduce alcohol consumption as this can be detrimental to health via dehydration and overloading the liver altering hormone and sleep chemical action.
 - Don't drink soft drink or caffeine drinks.....especially in the afternoon and night time.
- Use sleep aids such as
 - body pillows, back supports and heat pads can help to relieve pain;
 - Moisturisers on the skin, mouth gels placed in the mouth prior to sleep and the use of sleeping masks can reduce symptoms of dryness. The night time can allow time to put thicker creams on the skin (particularly the feet and hands) to be absorbed with your own body heat while sleeping. You may need to use cotton gloves and socks.
 - If dryness is an issue, consider the use of a humidifier in the room.
 - Use of high thread count or natural fibre sheets can also help with comfort having a softer feel and less irritation of inflamed skin. High thread count sheets are also useful for maintenance of body heat and reduction of allergens e.g. dust mite.



- If you have been diagnosed with a sleep condition such as sleep apnoea then the aid of equipment such as a CPAP machine would improve your night time oxygen level and sleep ability. Strips to open nasal passages and mouthguards to reduce soft palate vibration can also be helpful if snoring is a problem.
- Drink water to rehydrate and consider having a close supply at the ready if you awake with thirst or oral dryness.
- Exercise during the day. Running and playing at least 2 hours before bed can help your body get ready for sleep.
- Avoid big meals before bedtime. Drinking warm milk or having lighter meals at night works better.
- Short naps can be restorative increasing cognition and concentration. However, avoid having daytime naps of over 1 hour as this can adversely affect your ability to sleep at night.
- The use of aromatherapy oils on bed linen or absorbers can help stimulate relaxation and calm the mind.
- Relaxation instruction, visualisation techniques can be taught so as to release anxiety and improve general wellbeing. These techniques can be combined with music that is calming has been shown to promote deep and restorative sleep.
- These can be simply incorporated into a healthy bedtime pattern. Create a bedtime routine which is relaxing and calming so that your body will learn the routine and get ready for sleep.



Story of sleep information sheet - Marline Squance , ARRC – June 2013

Reviewed by Associate Professor Glenn Reeves